INTERNATIONAL SOLDIER
SYSTEMS
CONFERENCE AND EXHIBITION
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Individual Warfighter Protection Against Enhanced Blast Weapon Effects

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The Science Behind the Warrior:

Yesterday, Today and

Outline

- Why we care: The threat
- Personnel Protection
- Experimental Work
- Theoretical Work
- Closing Remarks

Why We Care: The Threat

Background

The blast threat is not new:

However, the effects of volumetric/thermobaric weapons are not well understood in terms of the effects on the human body.

Army has sponsored research in the blast area

- Natick - Blast/materials interactions
- US Army Medical Research and Materiel Command (WRAIR) - Blast injury models
- US Army Research Laboratory (SLAD) - Vulnerability/Lethality Assessment Models

Personnel Protection

Individual Protection Program Focus

*Provide protective system(s) to reduce **primary blast lung injury** for Warfighter survivability in MOUT or other environments where blast-based threats may be common.*

Body Armor Focus for Blast Protection

Interceptor Vest

FFW Concept

Protection Overview

Objectives:

. . . Define hazard to the individual warfighter from volumetric/ thermobaric munitions

. . . Develop and insert advances in materials technology to improve the protection and performance of armor systems against the hazards associated with exposure to volumetric/ thermobarics munitions

. . . Develop a repeatable, verified method to generate and evaluate protection concepts

Technical Barriers:

- Undefined volumetric weapons' blast signatures
- Insufficient understanding of blast injury mechanisms
- Undefined material properties and performance under blast
- Lack of appropriate models for design, protection and operational tradeoffs

Payoff: Improved individual warfighter survivability

Defensive Research & Development

Army's Key Players/Personnel Protection

- US Army Research Laboratory
- US Army Medical Research and Materiel Command
- ✓ US Army Research, Development, and Engineering Comma

International Cooperation

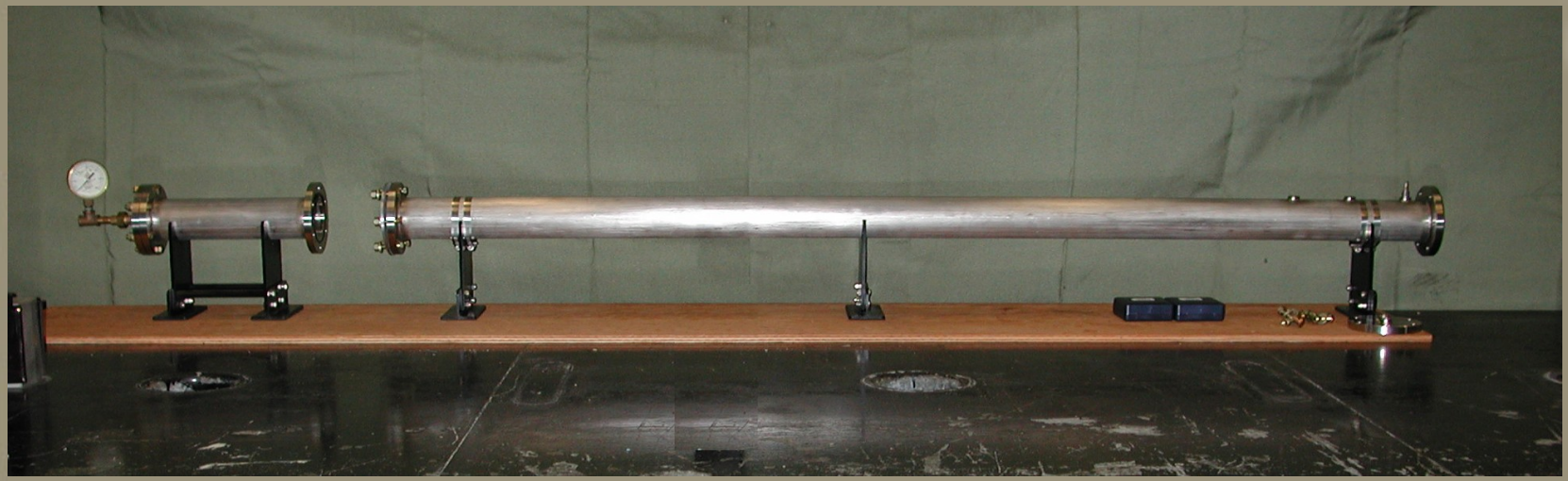
The Technical Cooperative Panel (TTCP)
New Technical Panel -TP5

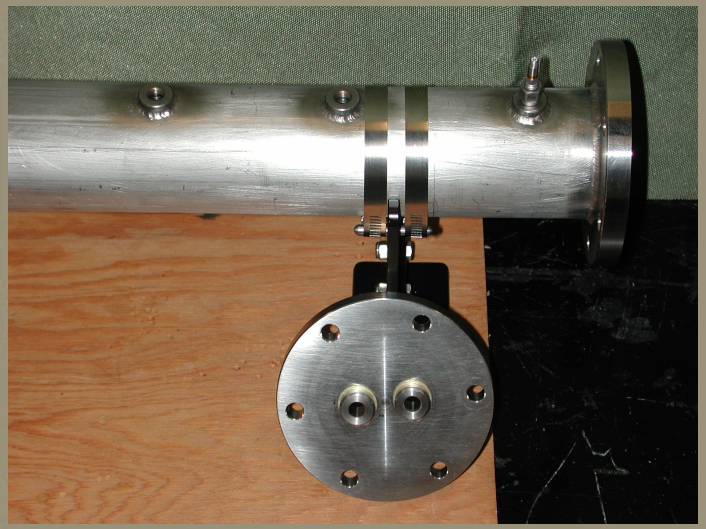
Joint Service Cooperation

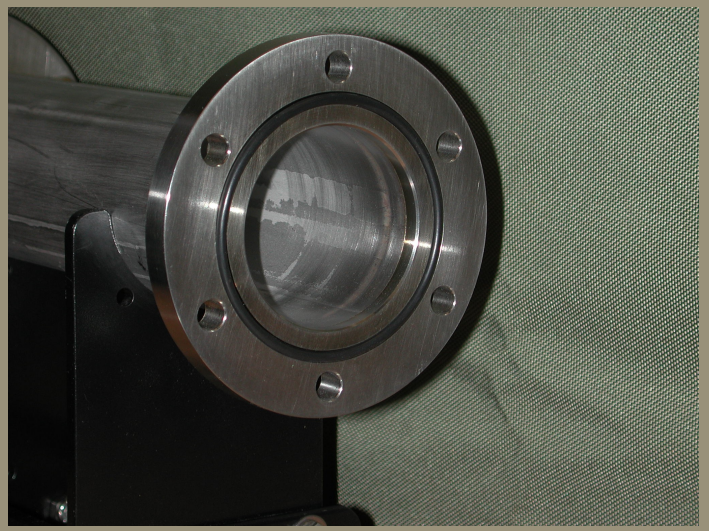
- Navy/Marine Corps

Experimental Work

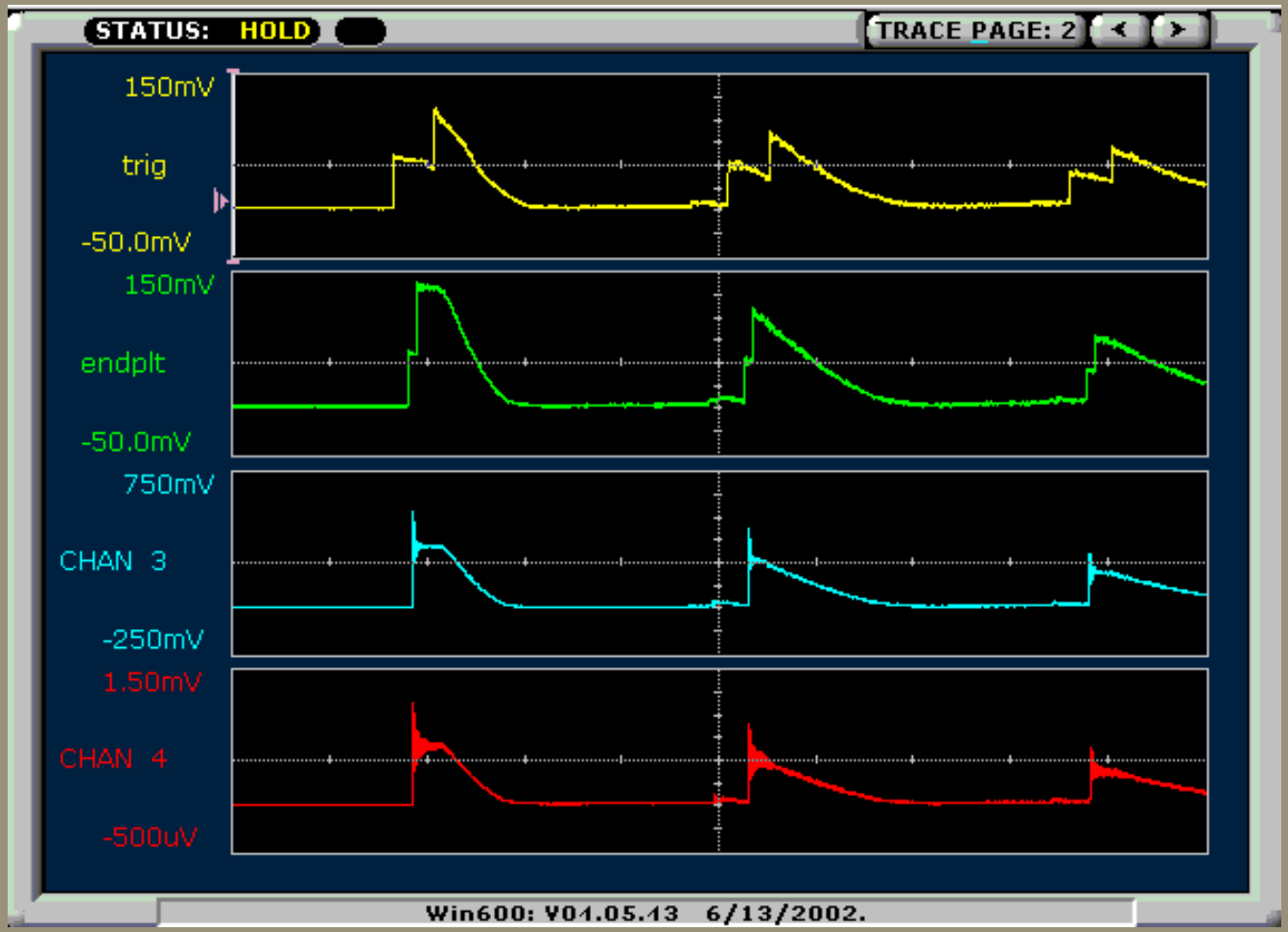
NSC Shock Tube



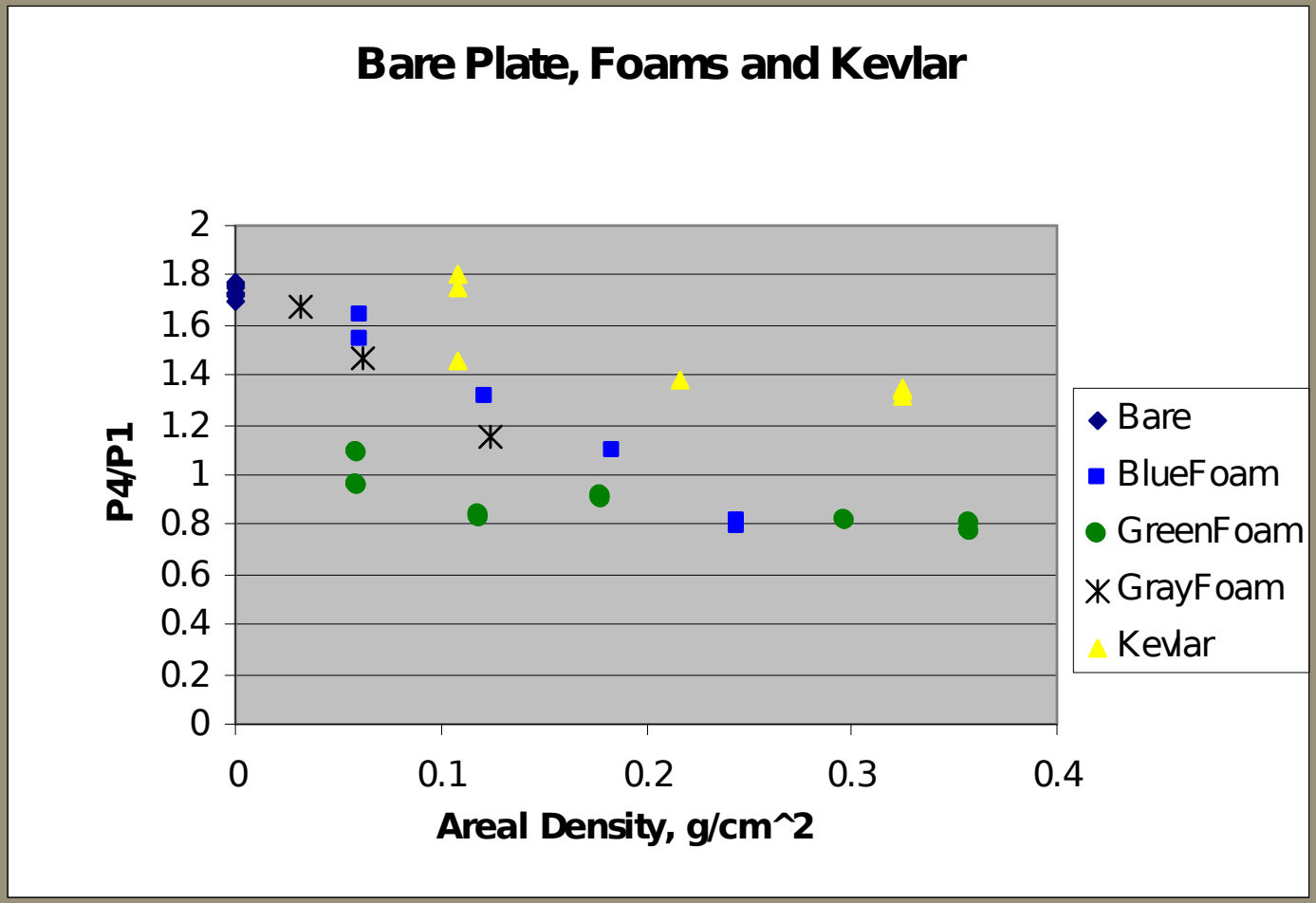




Typical Traces for Bare End Plate

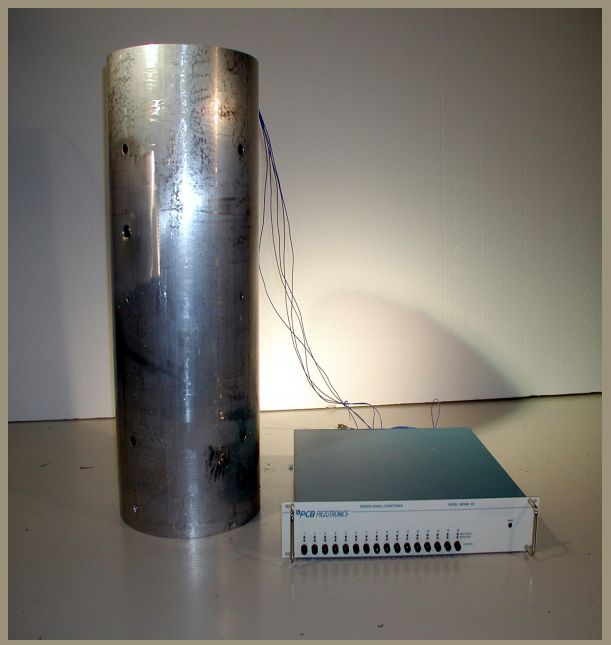


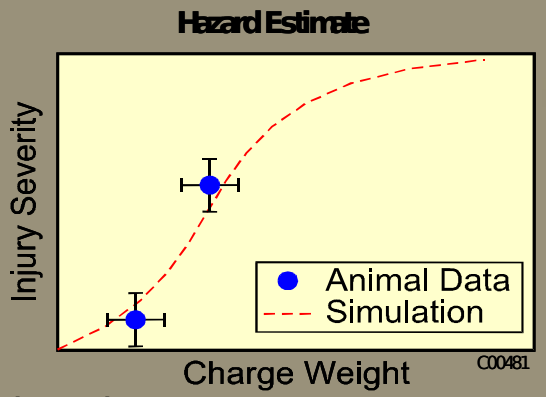
Pressure Ration for Recessed Sensor

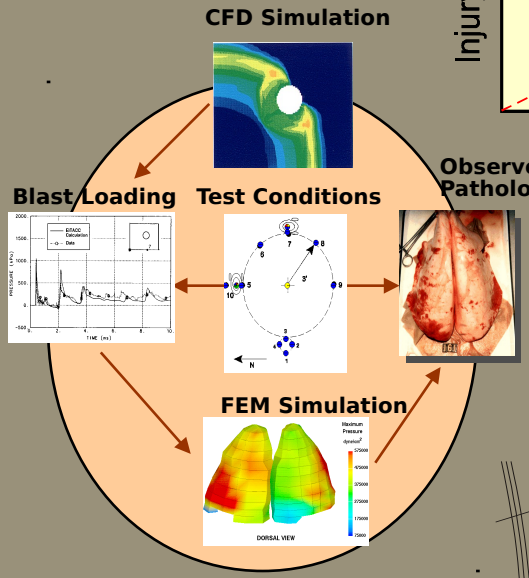


Free Field Testing at ARL

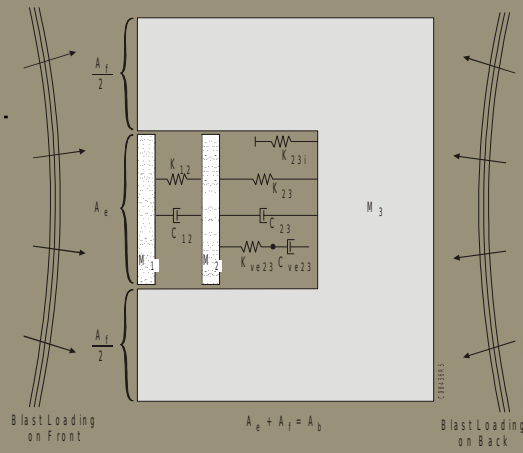
MRMC Blast Test Device







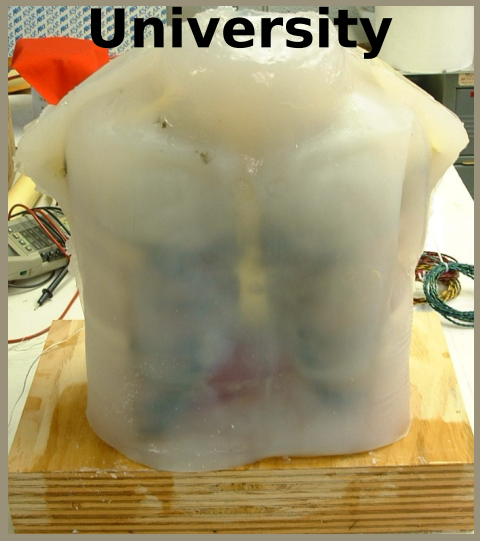
Modifications being made to allow for material system assessment

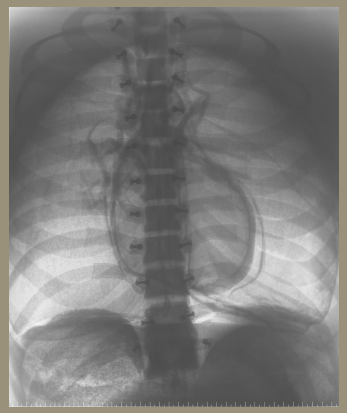


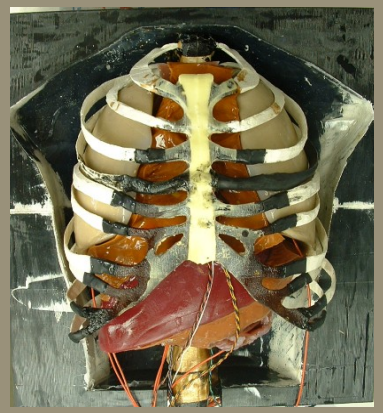
Other Potential Torso Surrogates

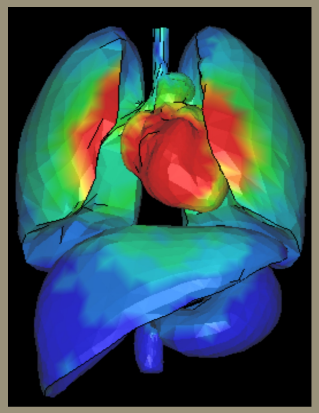
AUSMan - University of

HSTM - Johns Hopkins University



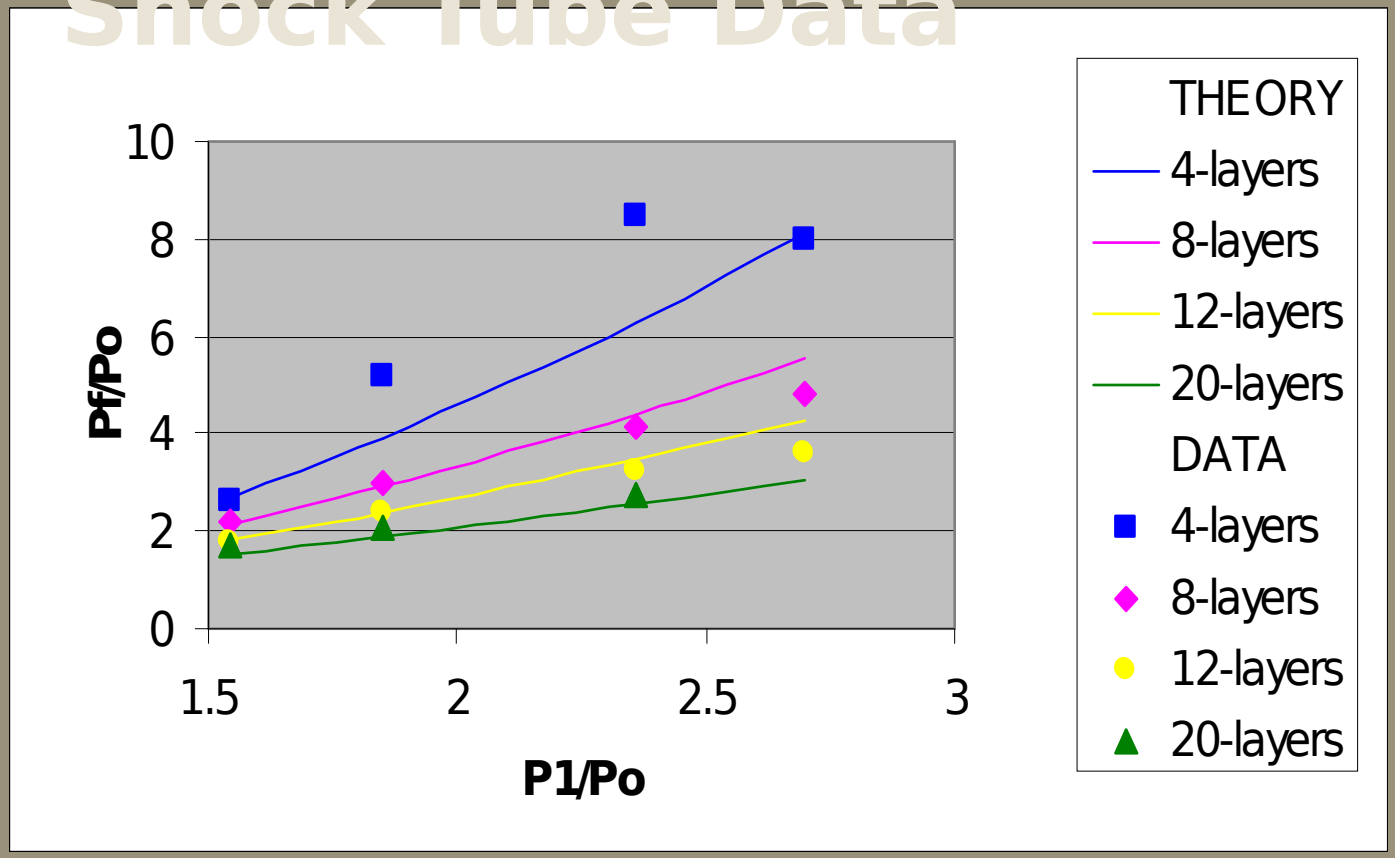




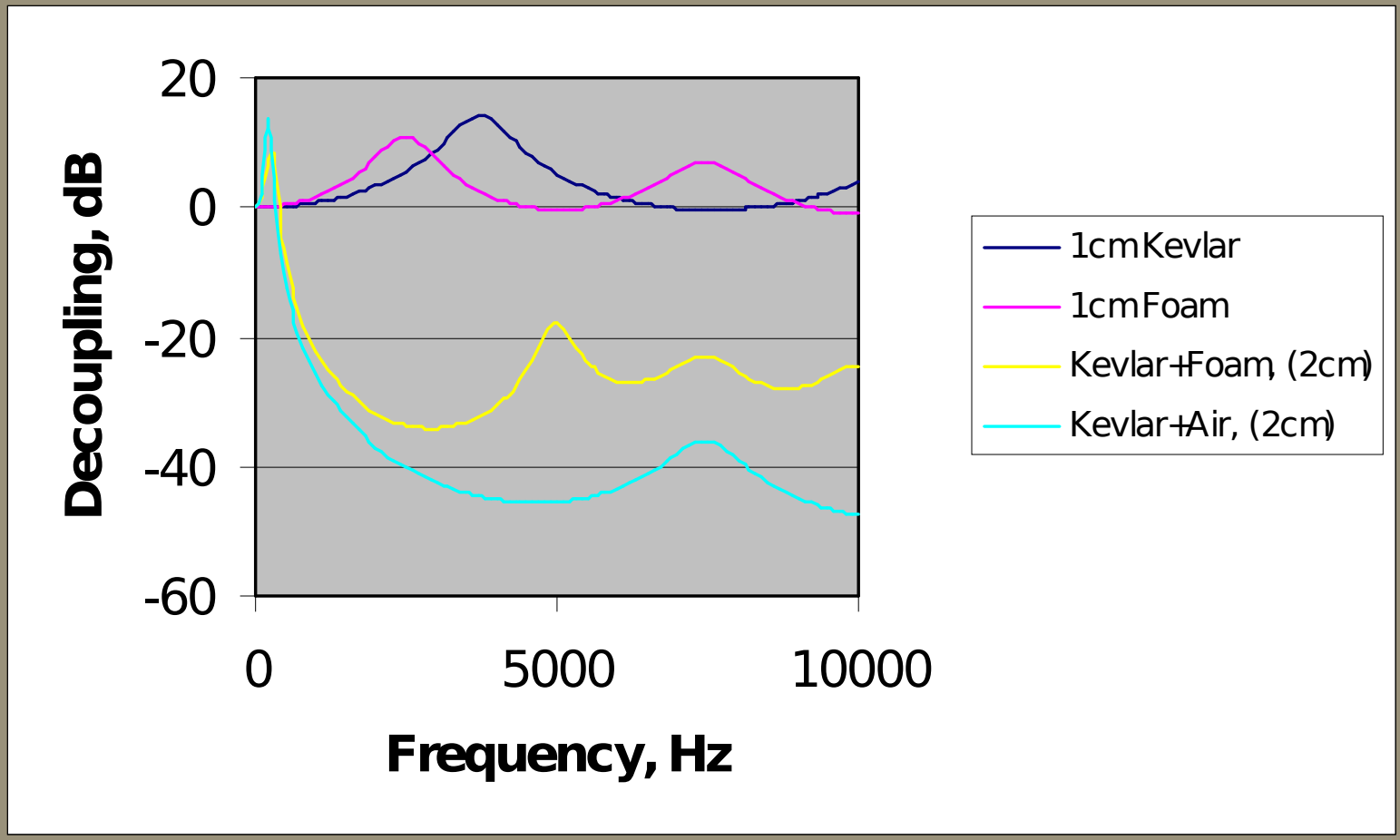


Theoretical Work

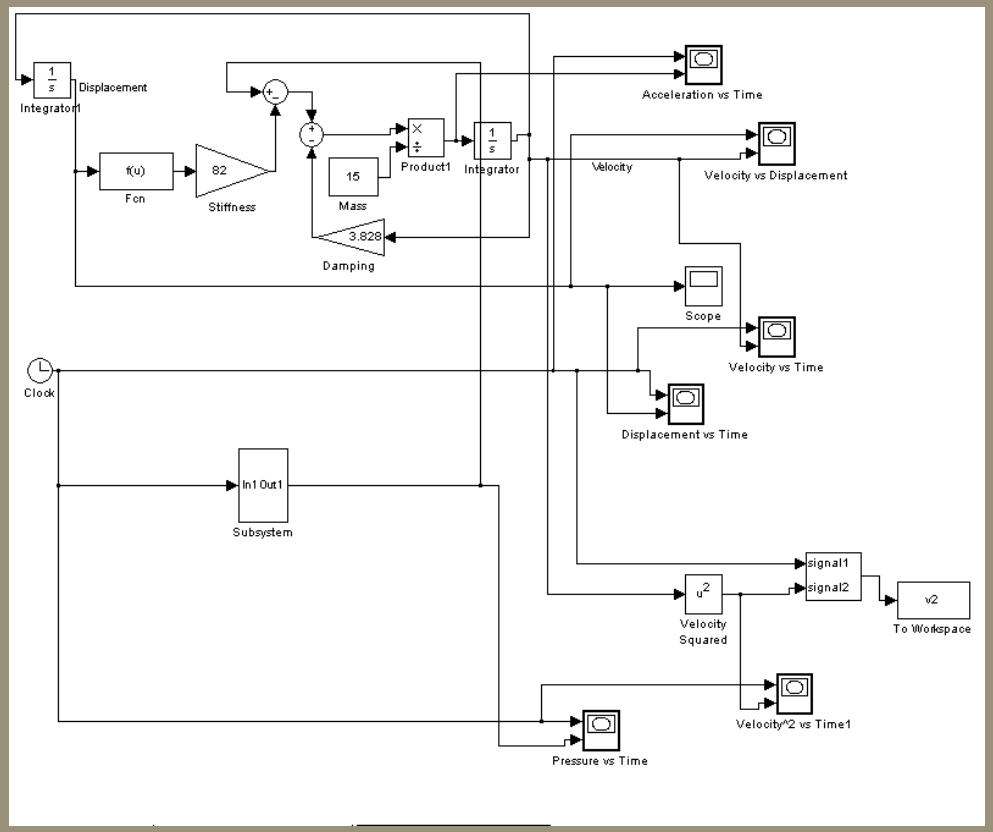
Modified Beranek Model vs. Gibson's Shock Tube Data

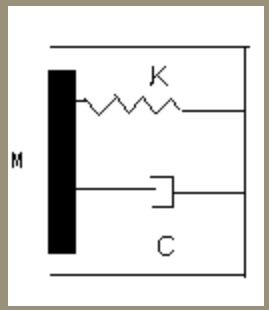


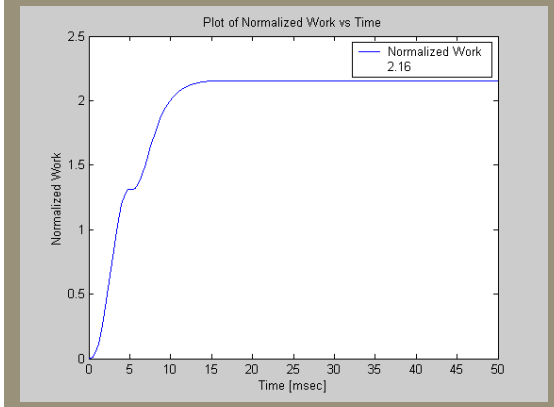
Wave Transmission Analysis



Simulink Code to Compute Normalized Work







W* vs. T

Closing Remarks

Summary

- Work is ongoing to quantify the behavior of enhanced munitions in both free field and enclosures
- Current devices and methodologies are being validated for use in predicting injury from enhanced munitions
- The current blast test devices are being improved to enable their use in the development of effective protective measures against enhanced munitions

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